COST AND MANAGEMENT

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Cost Accounting and Control in Shipbuilding . . .

By Richard Lowary

Fringe Wages and Production Costs . . .

By Robert E. Seiler

Lumber Costs, Direct vs. Absorption . . .

By Frank M. Carter

LOSS

Official Journal of

The Society of Industrial and Cost Accountants of Canada

Feb., 1956

MANAGEMENT NOTE

1956

As we entered 1956 most of our economists and business leaders in Canada forecast that the coming twelve to eighteen months would be the most flourishing in our immediate history.

—All good business men will be competing for their full share of the increased business available.

—Regardless of the size or special circumstances which may govern your business, there is no basic reason why you cannot make your organization the best **of its kind** in the world.

—The most successful organizations have taken advantage of all the proven management tools to become leaders in their industry. Those firms who fail to do this will be left behind competitively through this period.

—**If you plan to be the best,** we believe you could not pick a more propitious time than now for action.

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Cost and Management

VOL. XXX FEBRUARY No. 2

COST ACCOUNTING AND CONTROL IN SHIPBUILDING
By Richard Lowery 49

Mr. Lowery is President of Davie Shipbuilding Limited and of five other Canadian shipyards. He is also Vice-President of Canada Steamship Lines, Limited. Apprenticed to a shipbuilder in England, he became naval architect and executive with various shipbuilding firms abroad, joining Canada Steamship Lines in 1951. He is a member of the Institution of Naval Architects, Society of Naval Architects and Marine Engineers, North East Coast Institution of Engineers and Shipbuilders, Canadian Committee, and Lloyd's Register of Shipping.

FRINGE WAGES AND PRODUCTION COSTS
By Robert E. Seiler 59

The author is Assistant Professor of Accounting at the University of Texas and a C.P.A. in Texas and Ohio. He holds the degrees B.Sc. Com. and M.B.A. from the Texas Christian University and Ph.D. from the University of Alabama. Formerly Chief Cost Accountant with the Southwest Division of the Lennox Furnace Company, Dr. Seiler, prior to his present post, was Assistant Accounting Professor at Miami University, Oxford, Ohio. He is a member of the American Institute of Accountants and the American Accounting Association.

LUMBER COSTS, DIRECT VS. ABSORPTION
By Frank M. Carter 67

Mr. Carter has been employed by the Dead River Company, a New England lumber manufacturing concern, since 1946. A graduate of Fisher Business College, Boston, Mass., he passed his C.P.A. examination in November, 1954. Mr. Carter has been a member of the Bangor, Me., Chapter of the National Association of Cost Accountants since 1948 and is at present publicity director and elected secretary for the coming season.

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Editorial Comment . . .

GORDON COMMISSION

A Royal Commission was appointed last year to have a look at what sort of economic development is likely to take place in the next several decades. The study will attempt to foresee the problems attendant upon such development and suggest an economic blueprint for the country.

One might ask why such a commission is necessary. The Dominion Bureau of Statistics and other government agencies gather thousands of statistics which might be summarized into a picture of the Canada of tomorrow. However, the whole story cannot be gathered from figures nor from civil services. The country's economy will be built by people. The commission will have to query those who speak for the farmers of the West. It will have to know what is in the minds of business men everywhere and every other group that influences the economy. What problems are facing these different sections of our populace? What do they really think of the future and what are their plans?

This is the Commission's real job, travelling the breadth of the land interviewing, consulting and questioning those who may have significant information or a considered opinion on the Canadian economy.

The members of the Commission will hear of many regional problems. The somewhat depressed economy of the Maritimes and what can be done about it will be of first order consideration. Our newest province needs additional revenue-producing industries to improve and assist the economic situation. Or perhaps it should concentrate on its primary resources.

These are points of interest to the Commission:

Probably Ontario and Quebec offer no great problems except how to get enough power and transportation to continue their industrialization.

The West has several problems of a regional nature. The question of this year's wheat surplus is of immediate interest to the farmer but not to the Gordon Commission.

The future needs of the Canadian people from the western farmer are significant. How shall wheat be priced? Must we abandon export markets because of high prices? Should Government subsidies on food products, or for that matter on anything, be continued as good mid-twentieth century economics?

What is the best way to utilize the tremendous oil and gas resources of the West? Should we ship more East in an attempt to make the Canadian oil industry self-sufficient or sell below the border and re-buy crude at other points?

It is very apparent therefore, that there is no dearth of problems.

The Commission has been working very hard. Its members have been wisely chosen. They are taking their job seriously. All Canada is

awaiting the results of this important study. It may be that for the first time in Canadian history some suggestions will be made that will show the solution to some of our historic economic problems as well as provide a picture and a policy for the next fifty years on this great land.

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BOX 55 — COST AND MANAGEMENT

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C. & M. Round-Up . . .

By N. R. Barfoot, R.I.A.

The Booming Food Market

A total of 2.3 billion was spent last year by Canadians on the dinner table.

These are a few additional figures on the same subject.

Sales rose 6% over the previous year's total.

Some 1,350 chain stores sold 39.9% of the total and averaged $700,000 per store for the year.

33,000 independent grocers sold an average of $43,500 per annum.

There are 3,000 independent food markets now operating either as wholesale-sponsored or retailer-owned co-operative groups.

The food dollar is divided in this way:

Meats	27.3 cents	Fresh and cooked	23.8 cents
		Poultry	2.5 cents
		Fresh Fish	1.0 cents
Dairy	11.2 cents	Dairy Products	8.0 cents
		Eggs	3.2 cents
Vegetables - Fresh Fruits	14.1 *cents*		
Grocery	47.3 cents	Frozen Food	.7 cents
		Canned Food	17.3 cents
		Candy, Confectionery	1.9 cents
		Fresh Bakery	4.0 cents
		Other Food	23.5 cents

The one-stop shopping in large super-markets, flamboyant advertising, give-aways, premium deals, contests and lucky draws have all helped to push up the food bill.

The Economics of Computers

If you are considering investing in any of the new electronic data processing equipment, here are a few yardsticks that may help.

Large size computers rent from 20 to 30 thousand dollars a month and their greatest area of uses is where they can replace clerks in the number of 125 - 175.

Medium size machines rent for 5 to 10 thousand per month replacing 20 - 50 persons.

Small units rent from $500 - $1,000 per month and when used on inventory records and payrolls, may replace several more conventional types of equipment and their operators.

Other considerations are:

Some machines require controlled temperature and humidity so that you may need to buy air conditioning equipment.

Power consumption may require additional power equipment and supply.

Some machines are quite heavy and large so that alterations to buildings may be necessary.

The problem of deciding for or against electronic computing equipment is basically the same as that facing most manufacturing executives all the time.

The advantages and economic alternatives of new machinery need to be studied promptly and carefully. An economic survey by the companies making the equipment plus your own business skill will enable you to arrive at the proper decision.

Oil News

Canadian Crude output and use was 350,000 barrels per diem last year. By 1960 this should be close to 600,000.

In 1951 crude oil refining capacity was 408,800 barrels per day. In 1955, this has risen to 624,750.

Cracking capacity has gone from 192,625 barrels per day in 1951 to 336,575 last year.

Future capacity planned for the next year or two amounts to an additional 55,000 barrels per day.

U.S. Tariffs

58% of all imports into the U.S. are duty free.

52% of Canadian exports to U.S. are in this category.

40% of all U.S. imports into Canada are duty free.

The difference is in the class of goods exchanged between the two countries.

U.S. purchases are predominantly raw materials or semi-fabricated.

Canadian purchases are chiefly finished or nearly finished which bear a higher rate because they compete with domestic industries.

60% of our sales to the U.S. last year consisted of 10 principal items of which most were duty free such as newsprint, wood pulp, copper and unprocessed asbestos.

Movies and T.V.

Last year 208.5 million movie goers (down 10 million from previous year) paid 103 millions in admissions.

Some 50 theatres have failed in Ontario in recent years.

The Odeon chain estimates that 20% of its take comes from popcorn and confections.

There are 2,000 regular theatres and 50% of these are chain-owned and take in 81% of the gross.

Film rental is charged as a percentage of local theatre receipts after taxes. The range may run from 15% to 90%, depending on the film.

Of the 103 million taken in, 97 million was accumulated by the regular theatres and 6 million by drive-ins.

Distribution of the 103 million:

Taxes	$15.5 million
Promotion	17.0 million
Salaries	15.5 million

Overhead	18	million
Rental	33	million
Profit	3	million

The distributor's 33 million rental is split:

Wages and Salaries	$ 8.5	million
Taxes and Censorship	3.5	million
Operating Costs	2.5	million
To Producing Companies	18.5	million

This Year:

In June, 17,000 enumerators will begin Canada's first five-year census.

Construction will see another 5 billion plus year.

The population will grow 375,000.

Life Insurance sales will jump 25% with a record 3 billions worth of policies being written.

PERSONALS

Peter C. Higgs, a student member of the Toronto Chapter, has been appointed Cost Accountant with Chain Belt (Canada) Limited, Willowdale, Ont.

R. A. Dauncey has been appointed Secretary-Treasurer of Courtaulds (Canada) Ltd. He was formerly Treasurer. Mr. Dauncey is a General member of the Cornwall Chapter.

P. T. Hadden, R.I.A., of the Hamilton Chapter, has joined Robertson-Irwin Ltd., Hamilton, as Cost Accountant. He was formerly with Mercury-Chipman Knit Ltd., Hamilton.

Sidney M. Reinblatt, R.I.A., has been appointed Comptroller of the Fairweather Company Ltd., Toronto. Formerly of the Ottawa Chapter, Mr. Reinblatt was with Larocque (Ottawa) Ltd.

T. F. H. Meakin, formerly with Revere Electrical Distributors Ltd., has been appointed Office Manager and Accountant for Central Precision Limited, Toronto. He is a student member of the Toronto Chapter.

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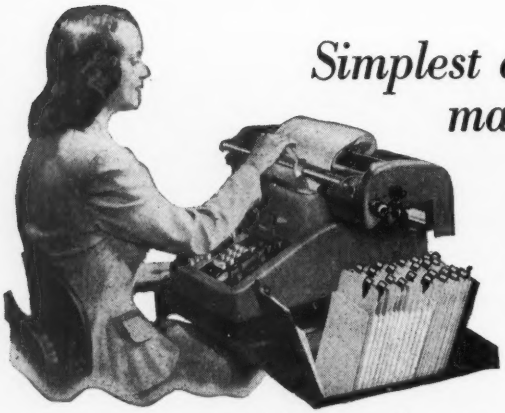

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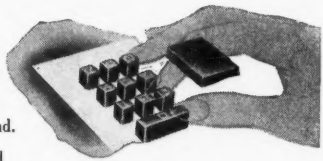

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Cost Accounting and Control in Shipbuilding . . .*

By Richard Lowery,
President, Davie Shipbuilding Limited,
Canadian Shipbuilding and Engineering Limited,
Vice-President, Canada Steamship Lines Limited.

With Canadian shipbuilding limited to the home market, competition is inevitably keen. It is not enough to build beautifully designed ships, but the cost of each ship must be carefully estimated from existing data and cost controls applied if the shipyard is to make any profit. In this article, the author discusses some of the costing techniques employed and the role of the cost accountant in shipbuilding.

SHIPBUILDING, upon final analysis, may be described as an "assembly" business but anomalous though it may sound it is also one of the most self-contained of any of our creative industries, calling for a wide variation of skills and techniques from its artisans and for more comprehensive and wide-spread technical ability from its staff than any other industry I can call to mind.

For example, the engineering staff must be able to plan and engineer, and later to rapidly and efficiently install and operate, any type of propulsion equipment including steam reciprocating, unaflow and turbine machinery with various alternative methods of steam generation; also direct and geared diesels, diesel and turbo-electric, and more recently, gas turbines, and shortly, it appears, must also learn how to deal with the problems of atomic propulsion.

Considerations in Ship Designing

Whilst some ships are designed by consultants, by far the majority of ships are designed by the shipyard's own technical staffs to satisfy the dreams or requirements of prospective Owners.

Each ship and ship type calls for special study of the conditions of operation and of the best means of achieving maximum operating efficiency consistent with minimum first cost. Designs of all similar vessels are carefully studied, together with any appropriate new techniques; many alternative machinery proposals alone may be studied before the final design is chosen and the specifications prepared.

We may feel that the problems of ship design are not great, or do not require much skill, but let us not casually dismiss this matter; the technical responsibility in units of such high cost is very great.

Let us remember that a ship must not only be an efficient combination of the principal characteristics of a port terminal, a power station and a hotel, but she must float upright and at the proper draft and trim, her machinery must propel her at the desired speed without undue vibration and with maximum economy of fuel. Her electronic and other devices must enable her to navigate the seven seas and their

*A lecture presented to the Quebec Chapter of the Society of Industrial and Cost Accountants on October 17th, 1955.

harbours with safety and to communicate freely with those ashore. She must frequently be equally suitable for service in the Tropics or in the North Atlantic in Winter.

She must be able to help herself in time of danger and therefore must carry her own fire fighting and life saving equipment.

With all the structural design problems of bridge and other vast structures, she must also possess the correct proportions of strength and flexibility and have inherent in her design stability and seaworthiness to enable her to weather the greatest storms with safety.

Every cubic foot of space or ton of material used unnecessarily deprives the ship of valuable cargo-carrying ability and is a permanent millstone around her economic neck.

The form of the hull and the buoyancy it receives from its element, the sea, must match the accumulated weights and centres of gravity of the structure, and its machinery and all the other multitudinous equipment, and the cargo itself to within say one-half of one percent, if the design is to be all that is desired.

The technical staffs must ever keep themselves abreast of the many technological changes and improved techniques. They must never just "copy" some previous vessel. They must, if possible, have something better to sell than their competitors.

Importance of a Cost Control System

One might be forgiven for assuming that the technical responsibility of designing a successful ship would in itself be sufficient for the shipyard staff; but this is not so.

It would be of little value if the staff designed beautiful, efficient ships but got none to build because either

(a) their prices were too high due to building inefficiency in the shipyard,

or

(b) their prices were too high because they were unable to accurately forecast the true final cost at the time of preparing the quotation and so had to provide "margin" in their estimate.

On the other hand, it would be equally disastrous if they did get orders because their prices were low, only to find that their estimating was at fault and the ship was ultimately completed at financial loss to the Company.

From the foregoing, we see that in order for a shipyard to be successful it must firstly have the plant, equipment, personnel, technical staff and management to enable it to design and produce ships as efficiently and cheaply as is humanly possible under the conditions prevailing.

Secondly, it must have a cost accountancy and control system to yield cost data which can be confidently applied to estimates for future vessels, though such vessels may bear little actual overall physical similarity to those from which the original cost data derived.

Accurate cost estimating by Canadian shipyards has never been more necessary or important than at the present time.

The Market

Wage rates paid in Canadian yards are, with the single exception of the United States, the highest in the world, and due to the fact that ships are individual custom-built units it is not possible to cut cost by mass production methods.

This is not to say that shipbuilding does not lend itself to reduction of cost by scientific management, because it does; but the economies to be effected are not to be confused with those which can result from tooling-up for multiple production.

With average wage rates in Canadian shipyards approximating two-and-a-half to three times those paid in Europe, it is self-evident that no matter how efficient we make our industry in Canada, we cannot compete on a price basis with European built vessels.

For some time after the last War, Canadian shipbuilders were quite successful in obtaining export orders and ships were built for Argentina, Venezuela, Columbia, Ecuador, Brazil, France and China.

At that time, orders were obtained largely because of the earlier deliveries possible from Canadian yards as European yards were booked up for years ahead, and also, of course, to the then relatively minor price differential.

The devaluation of the Sterling currencies, and the strengthening of the Canadian dollar have increased our relative costs to foreign purchasers, and together with the earlier deliveries now possible from Europe and Japan, have combined to sound the death knell for Canadian export shipbuilding until such time as conditions change.

The only remaining sources from which Canadian shipbuilders can get orders are the Canadian government and Canadian shipowners.

Unfortunately, the work available from these sources is insufficient to keep the shipyards properly occupied and every inquiry for a ship is therefore hungrily desired by every yard in Canada and competition is keen to the point of industrial suicide.

Under such conditions, careless, inefficient building methods, or casual "rule-of-thumb" estimating is obviously ridiculous and impossible.

Costing Techniques

Let us now consider some of the problems which must be dealt with in estimating the price of a ship, recording its ultimate cost in sub-divisions which can be compared with the original estimate, and in

the production of cost data for controlling the cost during actual construction.

To produce the data required the following techniques are adopted:

The ship is divided into a number of cost components or "job numbers" which, in different yards or under different conditions, can vary from a mere handful up to several thousand; in Davie we use about two hundred which is the minimum number we believe will yield a sufficiently detailed break-down of cost.

These cost components are descriptive of recognizable physical components of the ship, for example, cost component number 48 labelled "Livesaving" covers all expenditures involved in purchasing and installing davits, boats, buoyancy apparatus, lifebuoys and lifejackets, boat winches, gripes, liferafts, floats, falls, reels, lifebelt boxes or racks, rocket and rocket apparatus, and the material and labour expended in doing this work will be recorded separately.

Within each component the major material sub-divisions are summarized and direct labour is broken down into man hours and dollars of wages, overtime being recorded separately.

Among the direct labour trade sub-divisions employed in a shipyard we have Blacksmiths, Boilermakers, Burners, Carpenters, Shipwrights, Caulkers, Chippers, Coppersmiths, Cranemen, Drillers, Engine Fitters, Electricians, Furnacemen, Joiners, Loftsmen, Machinists, Platers, Bolters, Erectors, Painters, Pipefitters, Plumbers, Steamfitters, Patternmakers, Punchers, Shearers, Reamers, Riggers, Rivetters, Heaters, Holders-on, Passers, Testers, Stagers, Markers, Slingers, Tinsmiths, Sheetmetal workers, Welders, and general labourers.

Each of these "trade sub-divisions", together with their helpers, has a key number and the labour expended on any cost component is broken down and detailed under each trade sub-division. Further, separate headings show whether the work was performed in the shop or on the ship.

This information, which is summarized weekly, is most useful, not only for checking the total labour charged against jobs but shows clearly the trades employed and their individual expenditures.

For management efficiency control, "man-hours" is the only basis examined or used.

The trade sub-division numbers require very little policing since the men and the foremen obviously know their own trade classification, and work done on the ship has, in any case, different supervision than the same labour when it is performed on the ship.

Great care and constant policing is, however, most necessary to achieve accurate reporting with regard to "job numbers" and in this connection it must be remembered that a man can be engaged on several ships and on several job numbers in a single day.

Job number lists are printed and displayed throughout the shipyard. Convenient-sized booklets are printed and distributed. Every drawing contains a list showing materials required, corresponding purchase order numbers and also a list of all the job numbers covered by the drawing.

All purchase orders and store requisitions also show the appropriate job numbers.

Before any new vessel is started, the man hours anticipated against each job are listed, as is the breakdown of the man hours amongst the trades.

From this, total man hours allowed in the estimate for each trade is compiled. These are then grouped according to the responsibility of respective foremen and from this, "target man hours to complete the ship" are prepared and given to each foreman showing the various trade breakdowns under his control.

It is not only the duty of the foreman to build ships efficiently and well, but he is also responsible, with the help of the management, for keeping his man hours used to within the target figure.

Periodically during actual construction, progress estimates of every job and each labour sub-division are made and compared against labour actually expended. The percentages which have been used above or below the progressive target are indicated on summary sheets which go to all foremen.

On these sheets are also shown "Total target man hours", "Man hours expended to date", "Man hours remaining", "weeks remaining to completion" and "weeks remaining for each trade" on the basis of the last week's expenditure.

When a more detailed sub-division of cost or analysis of production methods is required under any cost component or job number, time study men are used or further sub-division of the cost components is obtained by special sub-division of the job number into letter symbols.

In analysis of steel construction work, process costs on typical individual jobs are normally checked by time studies and then applied generally, but in any case, each week, summaries are prepared showing the "weight of steel issued to shop", "weight prepared for fabricating", "weight fabricated", "weight from shop to ship" and "weight erected at ship".

From experience and from curves plotted from previous ships, the Production Manager can measure whether or not his steelwork is being produced within the anticipated "man hours per ton" figure; if not, he must find the reason and correct it.

The day-to-day production of the welding staff is measured by recording the weight of electrodes deposited per man hour for various broad work classifications.

Special Factors Involved

We must remember that ships take time to build and large sums of money are involved. The passage of time produces changes not known or anticipated in the orginial estimate and therefore, in comparing the final results with the original estimate, many special factors must be taken into account and the costing system must be such that it readily separates and shows these special factors in order that proper action can be taken to produce a common denominator for comparison purposes.

Some of these matters must not only be recorded in order to check final costs against original estimates but frequently also in order to enable proper invoices to be prepared for submission to the Purchaser, since they are the result of changes to the original conditions which determined the contract price.

Some of the factors which must be taken into account are:—

1. Escalation

In recent years most ship prices have been subject to escalation adjustment upon completion due to any changes in wage rates or working conditions and in laid-down material costs.

On such large complex units as ships with building periods averaging perhaps eighteen months, the proper recording of such changes is no mean task. Several methods are used for labour escalation correction, varying from simple to detailed formulae of actual increased cost. Several methods are also used to prove material escalation and, of course, the cost records of each vessel must suit the specific methods required by the contract.

Most ship contracts are basically similar, but the cost accountants must carefully examine each contract to ensure that the results they produce will conform to individual contract requirements.

When it is realized that some two thousand orders are issued for each ship with suppliers from all over the world and that actual documentary *proof* of escalation is necessary, it can be seen that great care is vital in preparing the accounts.

2. Exchange

With the wide fluctuations which have been somewhat common in recent years, exchange clauses have become usual in shipbuilding contracts.

Materials of great unit value (say $500,000. per unit) which were purchased abroad can and have suffered fantastic changes in price on a Canadian dollar basis.

3. Alterations and Additions

Few ships are built without the Owner's requiring some changes to the original concept.

These changes result in extras or credits to the contract price and must be carefully integrated into all the cost estimates and resultant data in order that the true cost picture will emerge.

The cost of any ship is, of course, the summation of direct labour, material (including sub-contract items) and overhead.

We have not, up to the present, given any consideration to the cost controls and records used in connection with overhead.

The actual items included in overhead vary from yard to yard and in making cost comparisons total cost is actually the only reliable measure. For example, such matters as storekeeping, drawing office, cranemen, electric current, transportation, etc., are treated differently in different yards.

Generally speaking overhead can be divided into "fixed" and "variable" groups. While it is true that management can do little to control "fixed" overhead items such as depreciation, taxes, etc., nevertheless, the great bulk of shipyard overhead is comprised of items of a variable or semi-variable nature.

These latter items are all affected by the actual degree of activity in the yard and it is to these items that the major effort for conrol of overhead expense is directed.

Overhead is usually measured and distributed against the cost of production in proportion to the direct labour consumed.

It is, of course, appreciated that low overhead percentage is not, in itself, an indication of efficiency, it can actually indicate relatively too great a consumption of direct labour due either to inefficiency or inadequate plant facilities.

Based upon careful analysis for any yard a graph can be drawn within fairly close limits indicating the variation of overhead percentage of direct labour against the percentage capacity of the yard being utilized in any year.

The great difficulty in forecasting and budgeting overhead in a shipyard is the fact that very few units are produced, all of very high price.

In a shipyard, one day the production for the year may be estimated and projected into an overhead budget. A few days later the yard may receive an order which will consume say one million dollars worth of labour in the same year. This, of course, wrecks the budget which must therefore be corrected from time to time.

Careful watch is kept on all controllable overhead items and each month actual expenditures under all detail sub-divisions are compared with the estimated expenditure.

No major repair or maintenance work or capital expenditures are allowed unless approved as the result of a detailed "Request for Appropriation".

The Indispensability of the Cost Accountant

We in the industry, are fully aware that accurate cost estimates are impossible without accurate cost data and, further, that without accurate cost data properly related to suitable bases, we would have no accurate means of measuring the efficiency of our efforts.

Only by keeping in close touch with actual production and production methods and making themselves fully aware of the problems and pitfalls of the methods that can succeed and of those that will fail can the shipyard Cost Accountant really develop his own maximum potentiality.

The production of a beautiful, efficient ship is a fascinating and satisfying task for any man, but surely there must also be great satisfaction in being a cost accountant who makes ordinary figures unfold with vigour and clarity, for all time, the complex story of a ship's prenatal life and who can, by proper application of his knowledge, contribute greatly to the most necessary requirement that each ship built must be produced more efficiently than any of her forerunners.

Strange though it seems we are reaching the stage where shipbuilding could probably exist without rivetters, but it can never exist without cost accountants.

FOR FURTHER READING

APPLICATION OF COSTING PRINCIPLES TO SHIPBUILDING, R. Barras, The Cost Accountant, July 1950.

NOTICE OF EXAMINATION DATES

The dates for the 1955 examinations have been set as follows:

Accounting I	Monday, April 30th
Fundamentals of Cost Accounting	Tuesday, May 1st
Advanced Cost Accounting (Paper I)	Wednesday, May 2nd
Accounting II	Thursday, May 3rd
Business Mathematics	Friday, May 4th
Advanced Cost Accounting (Paper II)	Saturday, May 5th
Industrial Organization and Management	Monday, May 7th
Industrial Legislation	Tuesday, May 8th

Books in Review . . .

PRACTICAL DISTRIBUTION COST ANALYSIS

By Donald R. Longman, Ph. D., and Michael Schiff, Ph.D., C.P.A.—published by Richard D. Irwin, Inc., Homewood, Illinois, 1955-*B.P.* 443 *with a Short Index—Price* $6.50.

By GEORGE MOLLER, D. Jur., A.C., R.I.A.

As sales costs become again, in general, a percentage-wise increasingly important part of the sales dollar, their recognition, proper charting and resulting control pose problems which require well thought out and still practical solutions.

These conditions obviously led the authors to the writing of a heavy text book on a certainly specialized branch of cost planning and control. The book is advertised as a reference work and professional aid for accountants, market research men, auditing firms, sales executives, lawyers, and business libraries. As the title promises, the study is primarily an analysis of distribution costs illustrated on the example of a wholesaler and a manufacturer. The book has to be studied. The presentation is rather heavy, interleafed with many schedules and forms which could be adapted to the individual requirements of active companies in accordance with their needs. The authors cover the field very thoroughly. In fact, in some parts, one cannot help but feel that the text goes into too much detail but the skilled reader will make his selection from the material presented so amply, without drowning in the allocation sheets which, even in small print, cover two adjoining pages (see, for instance, customer cost allocation sheet on page 293).

There can hardly be a doubt that, for instance, the chapter on the nature of distribution costs listing thirteen objectives of distribution cost accounting, or the chapter on marketing expenses presenting nine important facts about cost analysis by products and customers, will be of great assistance to those financial and/or sales executives who are forced to grapple with the involved problems which present themselves in the moment when an enterprise advances from the over-all uniform percentage of sales costs in relation to sales revenue, to an analytical evaluation of the costs by products or territories or customers, or a combination of all three. The men in practice will welcome Chapter 14, "Short-Cut Methods and Marginal Analysis", which permits the practical application of the methods developed in detail without excessive cost-splitting and accumulation.

The chapters on distribution cost standards will be of great interest to the industrial and cost accountant.

The book presents for the student and instructor, at the end, problems in distribution cost analysis which lend themselves to classroom work.

Altogether, Longman and Schiff have provided a valuable addition to specialized cost accounting which, in the reviewer's opinion, will be followed by other writings on the subject as the need for tighter perception of distribution cost problems persists and probably increases in the near future.

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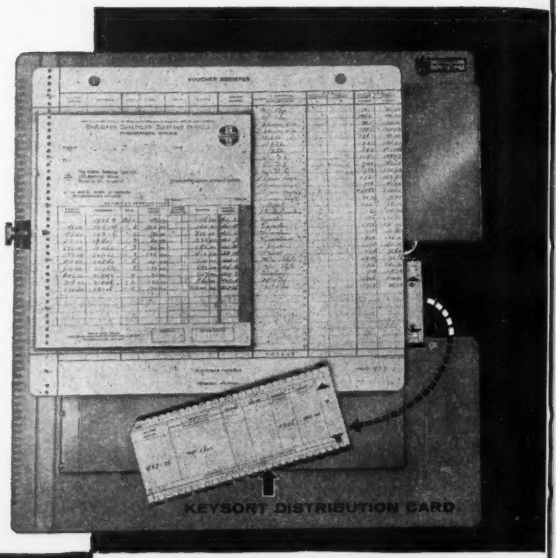

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Fringe Wages and Production Costs . . .

By Robert E. Seiler
Assistant Professor of Accounting, University of Texas, Austin, Texas.

Fringe wages form an increasingly large part of today's labour cost. Consequently, if he is to accurately relate labour costs to production volume, the accountant must familiarize himself with the complexities of this erratic wage element and their short and long-range effect on production planning.

FRINGE wage payments have almost doubled in the past six years — the average expenditure per employee has increased from $422 in 1947 to $817 in 1953[1]. When a worker is hired today, the wage rate no longer measures the labour cost, and the number of hours actually worked no longer measure the number of hours for which the employer must pay.

There is little question but that fringe payments are made in order to maintain an adequate and efficient labour force. Therefore, whenever labour costs enter into a management problem both base wages and fringes must be analyzed to arrive at intelligent decisions. Informed management must work with an increasingly complicated mass of labour cost data. Regardless of the staggering amounts involved, however, it is the variations in *methods* of paying fringe wages that interject the greatest complication into the interpretation and application of labour cost data.

One such complication, for instance, is the effect of supplementary wages upon accurate comparisons of labour costs. Such comparisons are of prime importance in the wage structure of many companies and become basic to sound management decisions. Another complication, less evident though perhaps even more important, is the relationship of these new payments to production volume and the break-even point. This latter aspect, the cost-volume problem, affects nearly every organization within the economy and is worthy of considerable attention.

However, an adequate comprehension of the cost-volume problem is of necessity coupled with an understanding of the extent and magnitude of current fringe wages. Unfortunately, aggregate fringe payments in terms of dollars are difficult to compile, for these costs are intricately woven into the whole fabric of a company's operations.

Fringe Wage Study

The most accurate study covering current fringe payments to date was completed by the United States Chamber of Commerce in mid-1954. Only a group of this type could hope to finance such a project and receive the co-operation necessary to accumulate valid statistics. The Chamber of Commerce was able to secure data from 940 companies, large and small, from all industries within the economy.

[1]These figures are based on a survey of 130 companies, scattered throughout all industries. Annual payments per employee were as follows: $422 in 1947, $525 in 1949, $684 in 1951, and $817 in 1953.

According to the results of this survey, fringe payments in 1953 averaged over $722 per employee per year for the 940 companies covered. This equalled 19.2 percent of the employee's direct compensation, or a total fringe cost of 35 cents for all hours worked by all employees. The following table presents a breakdown of the average fringe payments made throughout industry in 1953, according to the Chamber of Commerce survey.

AVERAGE FRINGE WAGE PAYMENTS MADE IN 1953 THROUGHOUT ALL INDUSTRY

Type of Payment	Cost per Hour per Employee	Percentage of Total Payroll
Legally required payments, such as payroll taxes and workmen's compensation	5.8 cents	3.2 percent
Pensions	6.8	3.8
Group insurance	3.2	1.8
Dismissal compensation	.1	
Discounts on purchases	.2	.1
Paid rest periods	3.6	2.0
Paid vacations	6.0	3.3
Holidays	3.7	2.1
Sick leaves	1.1	.6
Profit-sharing payments	1.1	.6
Bonuses, awards, etc.	1.8	1.0
Miscellaneous	1.2	.7
Total fringes	34.6	19.2
Premium payments (overtime, week-end, etc.)	11.4	6.4
	46.0 cents	25.6 percent

Thus, in the hypothetical "average" company, fringes constitute well over 19% of an employee's pay. Actual amounts paid vary from company to company, true enough, but viewed on an industry-wide basis these variations are relatively small. The following table indicates the average cost for selected industries.

1953 FRINGE PAYMENTS BY INDUSTRIES

Industry	Percentage of Payroll
Food, beverages, tobacco	20.0 per cent
Textiles and apparel	14.5
Paper, lumber, furniture	14.3
Printing and publishing	15.5
Chemicals and allied products	20.9
Petroleum refining	24.5
Rubber and leather products	15.6
Stone, clay and glass products	15.8
Primary metal industries	16.7

Fabricated metal products	16.0
Machinery	16.0
Electrical machinery	17.0
Transportation equipment	15.0
Miscellaneous manufacturing	17.9
Average, all manufacturing	16.8
Public utilities	20.5
Wholesale and retail	17.9
Hotels	17.7
Banks and trust companies	28.7
Insurance companies	22.8
Miscellaneous non-manufacturing	21.4
Average, all non-manufacturing	23.4
Average, all companies	19.2

The Cost - Volume Problem

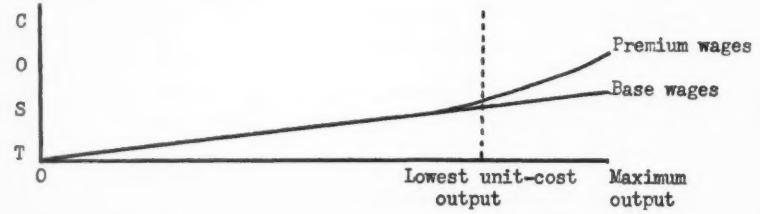
These increases in employee wages, made as they are through such varying indirect methods, have made labour costs not only one of the most important, but also one of the most complex cost elements. This complexity quickly becomes evident when an attempt is made to connect supplementary wages to production volume. The peculiar reaction of fringe payments to changes in output cause this cost element to be sometimes fixed, sometimes variable. This, obviously, poses a real problem to the accountant. The same type fringe payment may become fixed at the upper levels of output, variable in the middle ranges, but fixed again at the lower levels. The overall effect of fringes upon total labour costs is a disproportionate increase when production is either raised or lowered beyond a definite limit.

An analysis of each fringe method will illustrate the cost-volume problem more clearly. Then the various methods can be assembled into a composite picture.

For the purpose of this discussion, supplementary wages may be divided into those classes that display common characteristics, i.e., premium payments (overtime, week-end, etc.), payments for time not worked (holidays, vacations, clean-up time, etc.), group insurance, pensions, dismissal compensation payments, and social security contributions.

Premium payments. Premium payments are clearly a direct result of expanding volume. However, this type wage must not be treated as a completely variable cost, for it does not begin at zero output and increase until maximum production has been reached. Instead, premium payments begin in most cases only at that point where output exceeds the lowest unit-cost production that can be produced with existing facilities. Beyond this point premium payments tend to increase geometrically with production. By the time maximum output has been reached, the *per unit* cost will have been materially increased.

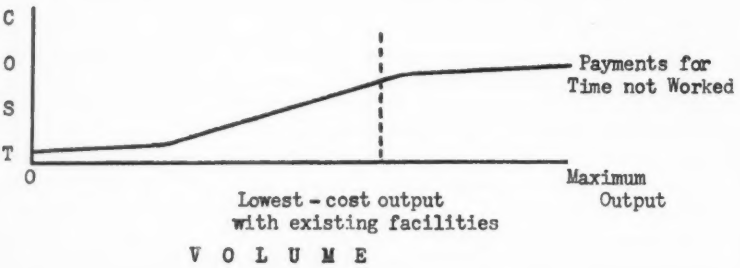
Viewed graphically, and assuming base wages are completely variable, the relationship of premium wages to production volume may be shown as follows:



Payments for time not worked. Payments to employees for vacations, holidays and clean-up time usually bear a reasonably close relationship to base wages. Again, however, these payments are not completely variable, shifting only as the *labour force itself* varies. An employee will have only one vacation and a predetermined number of paid holidays per year, regardless of whether he works three or seven days per week, or how long he works each day. He can receive an allowance for washing and cleaning up only once each day, whether he works four hours or fourteen.

Payments for time not worked will in the long run vary according to the number of workers added to or dropped from the rolls. The number of employees will normally increase at a constant rate only from a medium-low level of production to that point where the maximum labour force has been reached, usually just beyond the point where premium payments begin to mount. The amount paid for this fringe thus tends to approach complete variability only at that point where new employees are added at a rate constant with the rate of increased production, a condition that exists only with a short range of output.

Payments for time not worked could be illustrated as follows:



Group insurance. Group insurance follows very closely the pattern set by payments for time not worked, and in most cases will not increase or decrease in close proportion to base wages. The contributions are determined primarily by the number of employees on the rolls, coupled with the earnings of the individual employee, rather than by the level of production. Thus, the insurance cost is somewhat variable from zero output until the labour force begins to level off. From that point forward, the cost tends to remain constant, for there can be only one policy for each employee, regardless of the number of hours per day or days per week that he may work.

Pensions. Pension costs differ greatly from company to company because of wide variances in pension plans. In some instances this fringe will be a fixed cost, while in others it may be completely variable, or semi-variable.

If the cost is computed on a full accrual basis (the most accurate long-range costing method), this fringe will vary in a manner similar to that of group insurance contributions and payments for time not worked. Under this type pension arrangement the cost is determined primarily by the number of employees on the payroll, with some consideration given the base wages of individual employees.

On the other hand, some pension costing methods make this fringe a fixed item. If the pension cost includes only the cheques sent retired employees, a change in production, or a reduction in the working force, will not change the amount that must be paid; the cash outlays are fixed at the time the worker retires.

Dismissal compensation payments. Severance payments and dismissal compensation costs shift as the number of workers changes. However, instead of mounting as the working force increases, these payments tend to drop. When output is high, there are few employee dismissals, and even the inefficient workers can be shifted to other positions. But when production falls, these payments usually increase. As more employees are dismissed and production continues to drop, dismissal compensation costs grow still larger. During times of wholesale layoffs, the cost may become overwhelming.

Social security contributions. Social security contributions bear a closer relationship to production than most other fringes, for they are computed in all cases as a flat percentage of the employee's earnings. However, when output drops to a point where employees must be released in fairly large numbers over a period of time, the company may lose its experience rate, if one was in force. The employer's social security contributions will thus tend, over the long run, to increase as a percentage of base wages if production remains at low levels or is changed sporadically.

The Composite Picture

While it is true that the differences in existing fringe payment plans complicate an accurate portrayal of the cumulative effects of fringe wages on production volume, there are enough points of similarity to permit a composite picture. The *average* cost of fringe wages throughout all industry, as determined by the previously mentioned nationwide survey, may be used to portray the effects of supplementary wages upon the costs of a hypothetical "average" company. These payments may be summarized as follows:

	Percentage of Payroll
Premium payments	6.4
Rest periods, vacations, holidays	8.0
Group insurance	1.8
Pensions	3.8
Social security contributions	3.2
Separation pay	.05

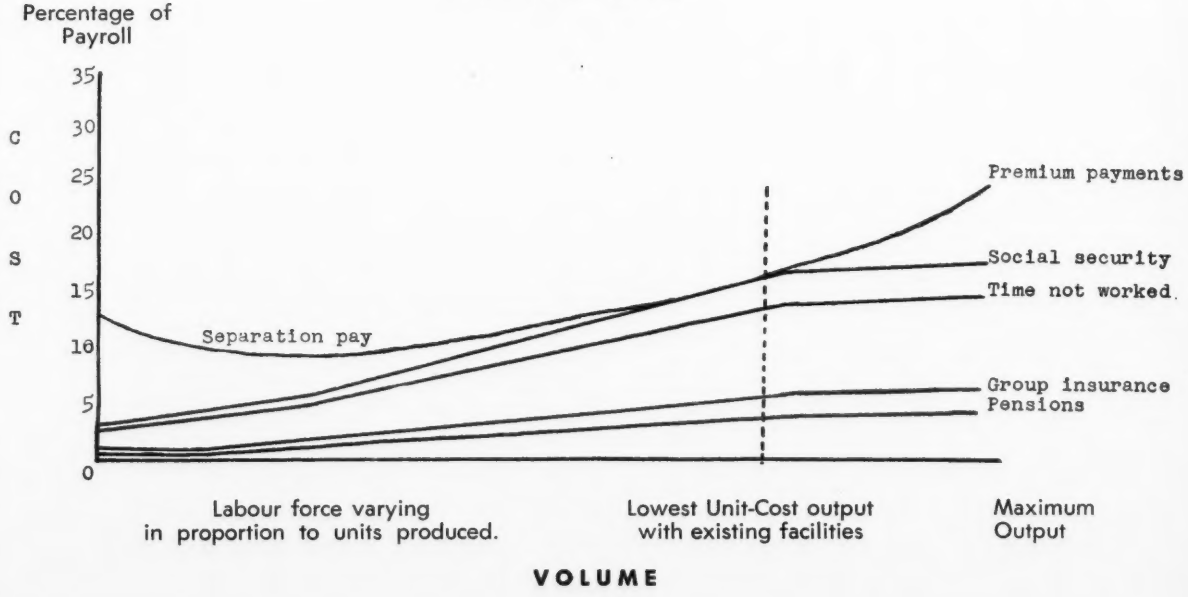
It must be remembered that these percentages were compiled from fringes paid in 1953, at the level of production then existing. For most companies this was not maximum output, but was somewhat above the lowest unit-cost production that could be expected with existing facilities. How would aggregate fringe costs react in these companies if production were to increase, or more realistically, were to drop? The following illustration has been prepared in an attempt to answer this question.

This illustration is not intended as a statistical analysis of the amount of fringes that will be paid at various levels of production, for such an analysis is impossible. It is intended only as a graphic portrayal of the overall tendency of these indirect wage payments to form a "U-shaped" curve. This means that fringes will, in most companies, tend to increase unit costs more than proportionately when production is either raised or lowered.

The economic advantages of stabilized employment conditions are well known, and organized labour's drive toward that goal has been highly publicized. The U-shaped curve wrought by fringe payment methods has tended to make stabilized employment *and* production highly desirable from the viewpoint of both employee and employer. Fringes are slowly beginning to close in the area in which units may profitably be produced, making a complete shutdown or an extreme cut in output very costly to the employer; at the same time, extreme increases in output also become more costly.

A company's break-even point thus lies within a narrowing range of production volume. This within itself is a significant development. But in addition, the break-even point has been shifted upward for industry as a whole. Any increase in fixed costs automatically raises the break

Fringe Wage Costs at Various Levels of Productive Capacity



point, and a large portion of fringes are fixed. A higher level of output must be maintained today than ever before, although this fact has been somewhat obscured by our present high volume production. While it is true that dollar profits have increased, total costs have increased more than proportionately; higher profits tend to hide the significance of higher costs. If economic conditions of the future were to bring a slight drop in prices, or reduce present high volumes, the shift in breakeven points would quickly be evident.

Break points would not be greatly affected if fringes were completely variable, and could easily be lowered. However, far from being completely variable, they fluctuate primarily in relation to the working force. Recent labour union pressure has been so strong that extremely heavy cuts in production are necessary before a noticeable reduction is made in the size of the working force. The number of working days or the length of the working day will usually be reduced before employees are dismissed. Fringes, varying more in proportion to the working force, will thus tend to remain high in the face of declining production.

Many estimates and conjectures must be made when attempting to separate the fixed and the variable portions of any cost element. Fringe wages are no exception. If anything, fringes present a greater challenge than do other costs, for each fringe reacts differently at different levels of production. As the amounts paid for supplementary wages grow, the problem of correctly analyzing and interpreting labour cost data, grows in complexity. Since all indications point to a continuing increase in fringes, an alert accountant must be aware of their immediate and long run effects upon production costs.

WHAT IS A "PROFESSION"?

A "profession" is defined by Justice Brandeis in a speech delivered at Brown University, United States in 1912 as follows:

> "First, a profession is an occupation for which the necessary preliminary training is intellectual in character, involving knowledge and to some extent learning, as distinguished from mere skill."
>
> "Second, it is an occupation which is pursued largely for others and not merely for oneself."
>
> "Third, it is an occupation in which the amount of financial return is not the accepted measure of success."

Lumber Costs, Direct vs. Absorption . . .

By FRANK M. CARTER,
Dead River Company
Bangor, Maine

While there has been a great deal of literature on the subject of costs, a large part of it is difficult to adapt to the small company. This is true, not because the principles involved would differ, but due to the physical limitation of the office personnel involved. In this article the author relates the experience of a small company engaged in the manufacture of forest products, in developing a workable system of handling costs. Its experience may be unique in that two systems have been operated, all inclusive costs and direct costs, and the Company has had a chance to evaluate both.

THE company involved manufactures and sells white pine lumber, with an annual capacity of up to 10,000,000 board feet per year. This is shipped to the New England and New York markets, and is ultimately used in home building, millwork, etc. There is also a small quantity of logs of other species manufactured which include spruce, Norway pine, hemlock and some hardwood. In addition to the lumber operation, hardwood bolts are sawed into squares and flat stock for sale to a company manufacturing wood novelties.

There are two sawmills, one at the location of the main plant, the other about twenty miles away. The company operates dry kilns and a planing mill. Only a very small amount of lumber is shipped rough; some is shipped air-dried but the greatest percent is kiln-dried. In addition to lumber manufactured at its two mills, the company purchases rough lumber from other mills in the vicinity. The company does not maintain its own logging operations but purchases logs delivered at the mills.

From the first we found there was a definite limitation on the quality of the accounting personnel available in the vicinity. This meant we had to develop a system as simple as possible, yet one which would give management the information it needed.

We operated several years costing our sales on an average cost per thousand feet, which included all fixed and variable operating expenses. We found that although this might be satisfactory for annual statements, it did not show a true picture for monthly statements due to the great variation in the value of the different grades of lumber shipped. For example, in a month when a large percentage of shipments were No. 2 Common and better, our profit would skyrocket. The next month, although management might have felt they had a very satisfactory performance, the income statement might show a loss.

The biggest trouble we got into on this setup was from a balance sheet point of view. We found that over a period of several years the high grades of lumber sold better than the lower grades, and we suddenly discovered that our inventory per the balance sheet was actually over-priced, because the inventory now contained a large percentage of low grade lumber. It was evident that our accounting system needed a thorough revision.

The All Inclusive Costing System

With the above as a general background, we proceeded to analyze our operation as to departments and to determine the flow of costs through these departments. After a great deal of study of the operation, and discussion with the superintendent the following departments were decided on:

Production
- Sawmill No. 1
- Sawmill No. 2
- Barmill

Processing
- Dry Kiln
- Yard

Shipping
- Planer
- Resaw
- Loading

Miscellaneous
- Log Procurement
- Steam Operation

A flow chart was made, see Exhibit No. 1, to help put across the picture of what made up the final cost.

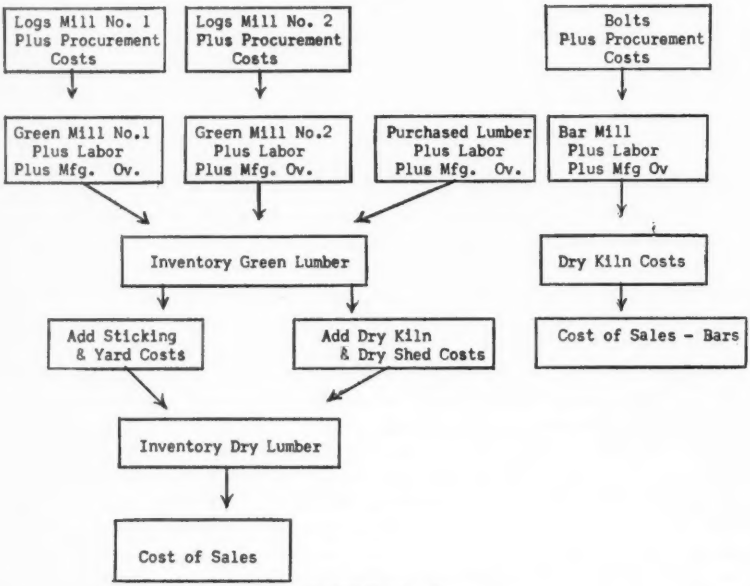

Logs Mill No. 1 Plus Procurement Costs
Logs Mill No. 2 Plus Procurement Costs
Bolts Plus Procurement Costs
Green Mill No.1 Plus Labor Plus Mfg. Ov.
Green Mill No.2 Plus Labor Plus Mfg. Ov.
Purchased Lumber Plus Labor Plus Mfg. Ov.
Bar Mill Plus Labor Plus Mfg Ov
Inventory Green Lumber
Dry Kiln Costs
Add Sticking & Yard Costs
Add Dry Kiln & Dry Shed Costs
Cost of Sales - Bars
Inventory Dry Lumber
Cost of Sales

EXHIBIT No. 1

The three elements of our all inclusive costs were analyzed as follows:

1. *Raw Material*

It was fairly simple to arrive at raw material costs in view of the fact that logs were purchased delivered at the mills. The cost of raw material became the amount paid for the logs plus the cost of log procurement. A perpetual inventory was kept on the logs in both feet and dollars and logs used were charged out on an average cost basis. We found, however, that it was necessary to discount our log scale by about ten percent in figuring our raw material cost. This was due to company policy of using the Bangor rule to scale logs on purchase, and the fact that rotary saws were used which took a large kerf.

The raw material for the barmill consisted of the following:

Hardwood bolts
Hardwood lumber from the sawmill
Slabs and waste from the sawmill

The assigning of costs to the bolts and lumber presented no problem. The slabs and waste were assigned no cost.

2. *Labour Costs*

Labour costs were figured on the basis of time cards, and presented no particular problem.

3. *Manufacturing Overhead*

The following chart was prepared:

Item	*Basis of Distribution to Departments*
Indirect Labour	
Superintendent, Payroll taxes	Equally to Labour costs
Watchmen	Production and processing departments
Firemen	Steam operation
Millwright, Heat, light and power	On basis of horsepower
Repair and maintenance	Repairs orders
Depreciation, Municipal taxes, Insurance	Valuation of equipment in various departments
Vehicle costs	Feet handled
Steam operation	⅔ dry kilns, ⅓ heat, light and power

The items in the right hand column were accumulated in the ledger during the month, and distributed at the end of the month to the various departments. Value of work in process as a separate item was not taken into consideration in figuring inventories, as in our operation it was found to be a very minor

item, except for the dry kilns, and the quantity here would not vary appreciably from month to month.

Income from by-products did not present a problem, since the greater part of the scrap, slabs and edgings were burned for fuel in the boiler to provide steam. There were slabs and edgings sold locally as firewood. This we treated as miscellaneous income.

The waste that was consumed as fuel was not assigned any value. We kept costs of our steam operation which was later prorated to dry kilns, and heat, light and power, but we had no accurate measure of the steam consumed by the kilns so an arbitrary estimate was used.

The costing of a lumber operation is complicated by the wide range of selling prices among the different grades. For the purpose of figuring cost by departments, all lumber was figured as log run. In other words a No. 4 Common board selling for about $70.00 per M accumulated the same costs as a D Select, selling for about $200.00 per M. However, after determining the average costs for the month, recognition had to be given to the range of selling prices of the various grades. This was accomplished by prorating the total cost to the different grades in relation to the selling price. The working sheet used for this allocation is shown in Exhibit 2. The total of the feet and cost was posted to our perpetual inventory, in which each grade was carried separately. The cost of sales was a weighted average cost, using the previous month's inventory plus the current month's production.

FLOW OF COSTS

		MILL NO. 1			MILL NO. 2		
Item	Selling Price	Feet	Total at Selling	Total at Cost	Feet	Total at Selling	Total at Cost
D Selects	200	27,872	5,574	3,915	7,616	1,523	1,121
No. 1 and No. 2	140	29,458	4,124	2,897	22,362	3,131	2,304
No. 3	120	41,840	5,021	3,527	21,583	2,590	1,906
No. 4	70	65,925	4,615	3,242	40,183	2,813	2,070
No. 5	40	35,523	1,421	998	6,010	240	177
Norway	90	2,455	221	155	16,098	1,449	1,066
Spruce	68	6,348	432	303	8,321	566	417
Hemlock	68	697	47	33	2,490	169	124
Hardwood Lumber	115						
Squares and Laths	120						
TOTAL		210,118	21,455	15,070	124,663	12,481	9,185
Average Per M			102.10	71.72		100.11	73.67

EXHIBIT No. 2

The system as outlined above was used for one fiscal year only. It was discontinued for the following reasons:

1. The unit costs arrived at were not meaningful to management. This was true for several reasons; one because there were no previous year's figures on the same basis with which to compare the figures, and also in thinking of costs, management was not accustomed to including all the indirect factors involved. If the system had been continued, time would have taken care of both of these factors.
2. The additional clerical work involved entailed hiring one additional girl.
3. In preparing forecasts for the coming year, management found it much simpler to think of such items as depreciation, taxes, indirect labour, etc., as totals, rather than as factors building up costs in each department. In other words, it was much more difficult to grasp the picture of the operation as a whole, while tracing through costs by departments.

The Direct Costing System

The following year a system of direct costing was used. Now our inventory cost included only the following:

Cost of logs
Direct labour

All other costs were deducted in our income statement from gross profit on sales.

In making this change we were probably jumping from one extreme to the other. It would have been more logical to include in our costs not only direct labour and material but also all other items which vary as to volume of production. We found later, because we did not include these items, our profit tended to be distorted due to seasonal variation in production.

In figuring our inventory we still used our perpetual inventory system, prorating our costs to the various grades in relation to the selling price, as shown in Exhibit 2. This we found to be very satisfactory, as it makes a realistic tie-in between the sales and cost of sales, regardless of what grade is shipped.

The year we made the shift to direct costing, we were immediately confronted with another problem in that the value of the inventory on the balance sheet included all items of manufacturing overhead. We were operating on a first-in first-out basis, so until our beginning inventory was gone we would have a double deduction for manufacturing overhead — the amount contained in the cost of sales, and the amount due to the current month's operation. This of course made our profit considerably less than zero. To overcome this factor we decided to use for our monthly statements a last-in first-out inventory. This left intact our old inventory, except as the total quantity of lumber on hand was reduced; and each month's profit reflected only the results of that

month's operation. In the meantime we are amortizing as a separate figure in the monthly cost of sales, the excess cost of the beginning inventory over present direct costs. As soon as the inventory is down to present costs we will go back to FIFO to get our records on the same basis as our income tax returns. As to whether or not we will show our year-end inventory for tax purposes on the direct cost basis has not been decided.

Conclusions

In evaluating our experience in lumber costs I believe the direct costing has been by far the most satisfactory, for the following reasons:

1. Simplicity in daily accounting, resulting in lower costs due to the fact that fewer personnel are required, and less supervision is needed.
2. Ease of budgeting and profit planning.
3. The company management had better understanding of the figures, and therefore could make use of them. They were always a bit skeptical of figures developed under absorption cost methods.

The drawback to direct costing in our experience, is that in any month of high sales and low production the profit tends to be high, and in a month of low sales and high production there is often a loss. However, in a business without a seasonal fluctuation in sales and production, this distorted profit in the interim statements would not occur. We hope to improve our system as time goes on, and the inclusion of other variable costs, in addition to the raw material and direct labour, will tend to mitigate these fluctuations. As long as management understands the fluctuation, we do not feel that this factor offsets the benefits gained by direct costing.

In considering both the pro's and con's of direct costing, I believe the practical advantages outweigh the theoretical disadvantages, especially where the selling price of a product is controlled by the market, rather than a markup from cost. From a balance sheet point of view, it seems to be more logical to carry forward to the next accounting period via the inventories only these costs dependent on volume, rather than those dependent on time as the "time" has elapsed as of balance sheet date.

FOR FURTHER READING

ACCOUNTING FOR THE B.C. LOGGING INDUSTRY, H. H. Adair, Canadian Chartered Accountant, Parts I and II, April-May 1955.

COST ESTIMATES FOR WOOD PRODUCT PRICES, V. E. Noltmeyer, N.A.C.A. Bulletin, June 1955, Sec. I.

SOME ACCOUNTING PROBLEMS IN THE LUMBER MANUFACTURING INDUSTRY, K. O. Roos, C.A., The Canadian Chartered Accountant, April 1949.

Student Section . . .

Comments by George Moller, D.Jur., C.A., R.I.A.

ADVANCED COST ACCOUNTING — PAPER I

QUESTION IV (7 marks)

Your firm which manufactures product X by a series of continuous processes asks your advice concerning the installation of a cost system.

The accounting system in use at present is designed for the purpose of preparing annual balance sheets and manufacturing, trading and profit and loss statements. Inventories of work-in-process and finished goods are estimated.

In the past year, competition has become much keener and the margin of profit on X has been lowered. As a result, the president would like the accounting records to reflect for each process, the costs, the monthly production, and the quantity and value of inventory in process at the end of each month.

REQUIRED:

(a) What general additions or alterations would be necessary to the present accounting system?

(b) In the operation of the cost system, to what accounts would the following be charged, and how would they be distributed to processes?

1. depreciation of machinery
2. supplies used in manufacturing
3. raw material purchased
4. wages of factory workers
5. salary of plant superintendent
6. salary of sales manager
7. cost of operating electrical power plant which services entire factory.

SOLUTION TO QUESTION 4

(1) Subsidiary cost records must be commenced.

(2) Control accounts in the general ledger must be opened for each subsidiary cost detail ledger.

(3) The classification in the general ledger for all material, labour and factory service put into production will be the control account for the subsidiary cost ledger instead of particular expense accounts.

(4) Subsidiary cost records will be classified by processes.

(5) All charges to subsidiary records will be analysed and classified according to the appropriate process.

(6) Physical movement from one process to another will be reflected by transfers in the subsidiary records.

(7) The inventory of work-in-process will be obtained from the subsidiary cost records.

(8) The flow of production will be controlled by the issuance of properly authorized production orders.

Classification of Costs and Distribution of Processes.

	Classification	Distribution
(1) Depreciation on machinery	Factory Expense	On basis of process in which machine is used.
(2) Manufacturing Supplies	Factory Expense	Charge to process using the supplies or, if general, distribute on basis of labour or some other yardstick.
(3) Raw materials	Inventory	To process as used.
(4) Wages of Factory Workers	Direct Labour	Charge directly to process using the labour.
(5) Salary of plant Superintendant	Factory Admin. Expense	Distribute on basis of Direct Labour to processes, or other.
(6) Salary of Sales Manager	Selling Expense	Selling expense is not distributed to production.
(7) Electrical power plant cost	Factory Expense	Distribute to processes on basis of Kwt. used.

COMMENT TO QUESTION 4

This question was, in general, not too badly reacted to. The sub-section (a) was less aptly answered than sub-section (b). The reason for this difference in the treatment of the two sub-sections of the question may be found in the fact that to answer the first part of the question, it was necessary to actually understand what the question was aimed at, whereas in the second part of the question, there was no understanding necessary, or in other words, the first section required some imagination, the second section, just memorized knowledge.

Correct answers for each of the seven questions in sub-section (b) were valued ½ mark.

QUESTION V (8 marks)

Your company manufactures product L, which it produces on a continuous process basis. The process comprises two departments A and B, and the material added in each department increases the number of units being manufactured.

Below is a summary of the cost information for the company's first month of operations.

	Dept. A	Dept. B
Material	$180,000	$135,000
Labour	78,000	82,800
Factory Service Expense	15,600	41,400
	$273,600	$259,200

You are also furnished with the following information:

(a) In Department A, 300,000 units were put into production during the month.

(b) Of the units put into production, there was a normal wastage of 75,000 units.

(c) 180,000 units were completed and transferred to Department B.

(d) Regarding the balance in process in Department A, at the end of the month, all material had been added, but only one-third of the labour and factory service expense had been applied.

(e) In Department B, 45,000 units were purchased for $135,000 and added to those received from Department A, and a total of 195,000 units were completed and transferred to finished products. The remainder were in process at the end of the month, with all material added but only 40% complete for labour and factory service expense.

REQUIRED:

(a) A departmental cost statement including unit costs by department.

(b) A schedule showing details of the valuation of work in process inventory.

SOLUTION TO QUESTION V

Your Company

Statement of Production Costs

Dept. A	Units	Unit Cost	Cost
Put into production	300,000		
Material			$ 180,000
Labour			78,000
Factory Service Expense			15,600
Less: Loss in Production	75,000		
	225,000		273,600
Less: Inventory of work-in-process	45,000	.96	43,200
	180,000	1.28	230,400
Dept. B			
Transferred from Dept. A	180,000	1.28	230,400
Added to production	45,000	3.00	135,000
Production cost			
Labour			82,800
Factory service expense			41,400
	225,000		489,600
Less: Inventory of work-in-process	30,000	1.864	55,920
Cost of goods completed	195,000	2.224	433,680

Inventory—Dept. A	Units	T.F.U.	Per Unit	Total
Materials	45,000	45,000		
180,000				
			.80	36,000
225,000				
Labour	45,000	15,000		
78,000				
			.40	6,000
195,000				
Factory Service	45,000	15,000		
15,600				
			.08	1,200
195,000				
				43,200

Inventory—Dept. B	Units	T.F.U.	Per Unit	Total
Materials	30,000	30,000		
365,400				
			1.624	48,720
225,000				
Labour	30,000	12,000		
82,800				
			.40	4,800
207,000				
Factory Service	30,000	12,000		
41,400				
			.20	2,400
207,000				
				$55,920

COMMENTS, QUESTION 5

This was a rather basic process cost accounting question. The fundamental points in this question were the determination of unit costs which a substantial number of candidates failed to even indicate. A number of students failed to indicate how a department cost statement should look.

Sub-section (b) of the question could have been included in the solution for sub-section (a). It actually was a further lead for the candidate to the necessity of properly determining work-in-process inventory.

It is surprising that a substantial number of candidates failed to correctly bring forward from Department A into Department B the figures they had correctly computed in Department A.

The submitted papers showed rather clearly that a sufficiently large percentage of the candidates either did never quite master process costs, basically taught in the fundamentals of cost accounting, or they had forgotten it. It is submitted that in a final paper the candidate could be asked any question referring to basic material taught in the basic courses, but in this case, process costs are actually part of the Advanced Cost lectures and usually form the first or second lecture in the course.

STUDENT SECTION

ACCOUNTING II

QUESTION II (6 marks)

The following items were discovered during 1954 which applied to the fiscal year 1953. What entries would be made during 1954 to correct the errors?

(a) The company failed to record a sale on account of $210 at the end of 1953. The merchandise had been shipped and was not included in the ending inventory. The sale was recorded in 1954 when cash was collected from the customer.

(b) The company failed to recognize $400 due from a consignee as a result of goods sold by this party at the end of 1953. The consignee had failed to report the sale of consigned goods and the company included goods of $260 relating to the consignment sale in goods on consignment.

(c) The company failed to recognize a purchase on account of $1,350 at the end of 1953 and also failed to include the goods purchased in the ending inventory. The purchase was recorded when payment was made to the creditor in 1954.

SOLUTION: QUESTION II

(a) Sales	$ 210.00		
Earned Surplus		$	210.00
1953 sale recorded in 1954.			
(b) Sales	400.00		
Earned Surplus			400.00
1953 sale recorded in 1954			
Earned Surplus	260.00		
Goods on consignment			260.00
(c) Merchandise Inventory — December 31, 1953	1,350.00		
Merchandise purchase			1,350.00

COMMENTS, QUESTION 2

The average mark obtained on this question was 3 marks out of a total of 6 marks. 61 students failed to try this question which indicated a failure on the part of the student to grasp the requirement of the question.

In the majority of cases the student failed to read the question carefully and hence the adjustments which were made were not considered from the standpoint of the accounts set out in the question. The assumption was made that the adjustment of prior years operations should be carried through Earned Surplus. Where the student presented a portion of the entry correctly credit was given for that portion.

QUESTION V (25 marks)

The A B Electric Company Limited publishes the following accounting data at 31st December, 1953 ($000's omitted).

Assets	1953	1952
Cash	$ 1,429	$ 5,094
Government bonds at market		258
Accounts receivable (net)	17,833	16,814
Inventories at lower of cost or market	42,029	41,006
Real estate buildings, plant and equipment (net)	19,186	19,188
Deposits and deferred charges	1,448	1,252
Patents rights and licenses	1	1
	$81,926	$83,613
Equities		
Accounts payable	$12,431	$11,618
Dividend payable	291	288
Provision for service guarantees	450	450
Advance payments on contracts	7,574	14,100
Income taxes payable	2,715	1,914
4½% sinking fund debentures	20,000	20,000
Common shares n.p.v.	10,656	10,203
Earned Surplus	27,809	25,040
	$81,296	$83,613

Statement of Consolidated Income for the year ended 31st December, 1953
($000's omitted)

Income from operations (after depreciation of $1,709)	$ 8,161
Profit on sale of real estate	167
Income from investments	84
	$ 8,412
Interest on debentures	900
	$ 7,512
Income taxes	3,590
Net Income for year	$ 3,922

Statement of Consolidated Earned Surplus for the year ended 31st December, 1953
($000's omitted)

Balance at beginning of year	$25,040
Add net income for year	3,922
	$28,962
Deduct dividends paid	1,153
	$27,809

REQUIRED:

(a) Prepare source and application of funds statement.
(b) Develop ratios where possible.
(c) From the foregoing interpret the financial policies followed by the company.

SOLUTION TO QUESTION V

The company has just about maintained its investment in fixed assets during the year as expenditures equalled the provision for depreciation. The bulk of the net profit has been reinvested in working capital.

Liabilities arising from advance payments on contracts have been reduced subsequently as has the cash. Accounts receivable and inventories have been increased. These conditions may have been caused by a reduction in business. Customers are financing less of the contracts and the company more which may be due to increased competition. The decreased use of advances from customers to finance operations may have been the reason for the issue of common stock during the year.

A B Electric Company Limited
Statement of Source and Application of Funds
for the year ended 31st December 1954

Sources of Funds		
Net Profits	$ 3,755	
Provision for depreciation	1,709	
Issue of common stock	453	
Sale of fixed assets	169	$ 6,086
Application of Funds		
Dividends	$ 1,153	
Purchase of fixed assets	1,709	
Increase in working capital		$ 3,224

A B Electric Company Limited
Schedule of Changes in Working Capital
for the year ended December 31, 1954

	1953	1952	Increase	Decrease
Cash	$ 1,429	$ 5,094	$	$ 3,665
Government Bonds (at market)		258		258
Accounts receivable (net)	17,833	16,814	1,019	
Inventories	42,029	41,006	1,023	
Deposits and deferred charges	1,448	1,252	196	
	$ 62,739	$ 64,424		
Accounts payable	$ 12,431	$ 11,618		813
Dividends Payable	291	288		3
Provision for service guarantees	450	450		
Advance payments on contracts	7,574	14,100	6,526	

Income taxes payable	2,715	1,914		801
	$ 23,461	$ 28,370	$ 8,764	$ 5,540
Increase in Working capital				3,224
			$ 8,764	$ 8,764

COMMENTS, QUESTION V

The students obtained an average of 11 marks on this question out of a total of 25 marks and 28 students failed to answer this question out of a total of 352.

The primary difficulty which appeared to face the student in this question arose from a failure on the part of the student to recognize that an analysis of the data presented was required in addition to the preparation of a statement of source and application of funds. In the presentation of the statement the student indicated, in a number of cases, a failure to appreciate the inter-relationship between the various items given in the problem dealing with the Fixed Assets with the result that the figures presented by the student in his statement were incorrect.

The solutions presented, as stated above, indicated a fundamental weakness on the part of the student in anlysing the data which was prepared and of being able to express the significance of the data. This, as stated in the question, was one of the major requirements.